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NEBC MEETING NEWS

October 1998. Dr. Lisa A. Standley, the Club's Vice President, spoke on the topic "Beyond the Brooks Range—Flora and Fauna of the Arctic National Wildlife Refuge." Among Dr. Standley's many activities, we learned, is participating in Sierra Club outings. Twice in recent years, she has enjoyed ten-day backpacking trips to the Arctic National Wildlife Refuge in northeastern Alaska. Both trips were in mid-June, and started with a flight into Fairbanks and transfer to a smaller plane that flew through passes in the Brooks Range to the Romanzof Mountains and the coastal plain of the Beaufort Sea, a couple of hundred miles north of the Arctic Circle. The area hiked was between two rivers, the Jago and the Aichilik, which flow northward from the mountains, crossing the coastal plain to the sea. The Refuge is contiguous with Indian lands and National Parks, which add to the wilderness landscape. It is home to the caribou's Porcupine Herd calving grounds and their migration routes to the mountains. Fortunately for us, Lisa was armed with a good camera and the ability to use it well. We were treated to excellent images of the region's plant life, interspersed with those of the often present and possibly curious caribou. Also, landscape shots illustrated some of the Refuge's varied habitats and unadulterated beauty. The hiking area ranged in elevation from near sea-level to around 5000 ft. Most of the landscape is devoid of tall trees, although some of the narrower valleys supported white and black spruce in sheltered areas. Low willows were the more typical woody vegetation. The narrow valleys generally run east-west while larger river valleys run north-south. Precipitation is surprisingly low there, with only about 10 inches per year, Standley said. The few glaciers seen while crossing the Brooks Range were relatively small and not growing, evidently remnants of earlier times with higher rates of precipitation.

The slide images gave a good sampling of the dominant plant families in the Refuge and the Arctic region, in general. The Cyperaceae, a family Standley knows especially well because of her research on the genus *Carex,* is one of them. Sedges were well represented and tipsy tussocks of cottongrass were frequently underfoot. More frustrating for Lisa than the tipsy tussocks, perhaps, was that nearly all the sedges present in June were flowering rather than fruiting, making identification very challenging. An-

other family well represented was the Salicaceae. A favorite for Standley was *Salix minima* which stood less than an inch tall with catkins of reddish flowers. The Saxifrage family was represented by several species of *Saxifraga* including *S. oppositifolia,* a circumboreal species present in New England, and the very unusual *S. eschscholtzii* with its tiny cushion-like rosettes of succulent leaves only 2 mm across. Jumping to the Rose family, we saw *Potentilla hypartica* (or *P. nana,* in some books), a close relative of New England's federally endangered *P. robbinsiana.* Also representing the Rosaceae were both species of *Dryas.* The hikers liked seeing *Dryas,* since it meant they would be walking on gravel substrate and not wobbly tussocks. Ericads were also represented in the tundra by white flowering *Cassiope* [or *Harrimanella* in some references], pink flowered *Rhododendron lapponicum* described by Standley as weedy everywhere, and *Loiseleuria* seen at around 5000 ft. elevation.

Also illustrated by Standley were: a *Douglasia* species (Primulaceae) which is endemic to Alaska and the Yukon; a *Hedysarum* (Fabaceae) which has aromatic, edible roots eaten by grizzly bears; yellow poppies, which trap heat and attract flies in cup-like flowers that tilt toward the sun, which in June's solstice sky shines for 24 hours per day; nitrophilous, orange-colored lichens growing on rocks where birds perch; caribou trails made in the tundra in the 1940s; caribou skeletons used for drying wet socks; musk-oxen simulating "fringed sofas" swaying in the breeze; aerial views of river meanders revealing a hundred or more years of geomorphology; vertical Jurassic formations with marine fossils; cliffs with gyrfalcon nest sites; sloping bogs at 4000–5000 ft.; and a grizzly sow with cub.

Standley recommended Pielou's *Arctic Naturalist* and *Birds of Alaska.*

November 1998. Dr. Bruce Lindwall, a recent graduate of the University of Massachusetts, spoke on the topic "The Effects of Habitat Fragmentation on Plants." Dr. Lindwall first thanked the New England Botanical Club for awarding him (in 1996) a Graduate Student Research Award to support his dissertation research. He then launched into a fascinating presentation of his dissertation research findings about genetic diversity in populations of three alpine tundra species, comparing fragmented populations from nine peaks in the Adirondack Mountains of New York with

nine sample sites within a continuous, unfragmented habitat of the Presidential Range in the White Mountains of New Hampshire. Previous studies on the effects of fragmentation on loss of genetic diversity, he said, have involved habitats with a relatively recent history of fragmentation (i.e., less than a few hundred years) and only one taxon. He thought, by examining high peak populations presumably separated for thousands of years, that the effects of time on genetic drift and genetic diversity might be more apparent. By examining three species, he hoped to reduce the possibility of any erroneous conclusions made by assuming that what is true for one is true for all. Lindwall identified the three key questions he wanted to answer in the study as: 1) Do fragmented plant populations in the Adirondack peaks have less diversity than the continuous population in the White Mountains? 2) Is there more gene flow in the Presidential Range than among the fragmented populations in the Adirondacks? 3) What effect does greater habitat area have on diversity in the White Mountains versus the smaller area for each of the isolated Adirondack sites?

A fortuitous coincidence of Lindwall's site design, he added, was that the overall land area and distances between sites for the two study areas were approximately the same. To quantify the relative abundance and frequency of each species, 6000 plots, each one m^2, were examined. The genetic diversity was assessed using allozyme analysis. The three species studied were *Minuartia groenlandica,* which appears to be exploiting disturbed trail-edge habitat, *Carex bigelowii,* which forms large patches in the White Mountains, and *Diapensia lapponica,* a monotypic genus found in tundra. Three thousand tissue samples were taken and analyzed during the study.

For each of Lindwall's three questions, the answers were "yes," "no," and "maybe." Did the fragmented Adirondacks have lower genetic diversity? For *Diapensia lapponica,* the answer was a statistically significant "yes," but for *Minuartia groenlandica,* he found higher diversity at all Adirondack peak sites than at the Presidential Range subsites. The results for *Carex bigelowii* were not as easy to interpret. The overall genetic variability was higher in the White Mountains, but because *C. bigelowii* is less abundant in the Adirondacks than the Presidential Range, the sample size was small and only one of four indices was higher, statistically. Thus, we have a "maybe." What about

gene flow? Lindwall created dendrograms to illustrate degrees of similarity (or difference) in both genetics and geographic distances among the populations. Comparing Nei's index of genetic identity for each of the three species relative to the Adirondacks and Presidentials, the answers were again mixed. For *C. bigelowii,* there was a close relationship among all sites in New Hampshire but not so among the New York sites. *Minuartia groenlandica,* on the other hand, showed no particular pattern with generally good gene flow across the board. However, the most genetically distant population in the Adirondacks was from the most distantly isolated peak, the Gothics. The story with *D. lapponica* also seemed to relate to distance between sites. In both areas there appeared to be good gene flow with near neighbors, such as among the four McIntyre Ridge peaks in the Adirondacks, but less so when distance was greater between sites. What role does habitat area play? With *C. bigelowii,* there was a clear relationship: bigger places had more variability. Just the opposite was true for *Minuartia*: the smaller sites in the Adirondacks had statistically higher variability than the continuous population in the Presidentials. For *Diapensia,* size appeared to have no effect, and thus we have a "maybe" answer.

There was one general conclusion that fit all three species, Lindwall said in summary: The greatest amount of genetic diversity occurs where each species is the most abundant. He also concluded that we should neither assume that species will behave the same despite similar histories, nor for conservation planning purposes assume that the largest habitat area will support the most diverse population of a given species.

December 1998. The program, entitled "Verdant Venues and Ventures: Visible and Verbal Visions" represented the annual event where Club members are invited to make short presentations on their explorations over the year. Keith Williams led off with images from a South America vacation trip with his wife in May. It was the middle of the dry season in Brazil, their first destination, but they still saw lots of water because much of their time was spent on the coast and in the Pantanal, a huge wetland that extends into two other South American countries. Plants featured in the slide images were *Tabebuia alba,* an endangered tree species in Brazil; *Cuphea melvilla,* a prolific shrub along the Pantanal waterways; and *Ludwigia inclinata* and *Cabomba furcata*

growing in sloughs and shallows of the Pantanal. He ended with shots from Peru's Inca Trail to Machu Picchu and an image of an *Equisetum* growing from the mortar of stone ruins.

Marsha Salett followed Keith with a brief introduction to her Master's degree project at the University of Massachusetts—Boston which is to create a CD-ROM version of a natural history guide to bogs of southern New England. She showed images of several bogs with public access that she might feature in the guide, as well as a few that lack easy access or boardwalks that she may omit. Her intent is to present explanations and illustrations of bog types and common species such as *Kalmia angustifolia* and *Ledum groenlandicum.* Dichotomous keys and images of plants in flower and fruit will be provided to help with identifications.

Lois Somers then took us back to the tropics with images of a trip with husband Paul to Costa Rica. Being a registered nurse, not a botanist, she used a few wildlife images to illustrate some of the critters botanists need to be on the watch for while probing the greenery. The images included an orange-kneed tarantula seen in the Monteverde cloud forest and an eyelash viper seen at Braulio Carrillo National Park. Aquatic critters to be aware of included caiman seen on the Cano Negro River near the Nicaraguan border and the much larger and fiercer crocodiles of the Palo Verde region.

Joanne Sharpe's slides started in Costa Rica with an image of *Danaea wendlandii,* one of the fern species she studied there for six years. She then took us to Puerto Rico for a look at disturbance studies of ferns in a palm forest before and after Hurricane Georges, and in mangrove swamps, where the 14 ft. tall leather fern, *Acrostichum danaeifolium,* was regenerating following four years of hydrologic disturbance from dike construction. Her last stop was Maine with images from the Coastal Maine Botanical Gardens in Boothbay, where *Nyssa sylvatica* can be found at or near its northern limit.

David Hunt continued the regional theme with images from New York where he has been helping to refine the state's plant community classification, particularly in the Northern Appalachian Ecoregion. His images included riverside ice meadows with *Prunus pumila* and *Andropogon gerardii* and pine-dominated rocky summit communities with either pitch or red pine and associates such as *Vaccinium myrtilloides, Amelanchier bartrami-*

ana, and *Oryzopsis pungens.* He then took us underwater at Lake George where he has been doing underwater vegetation sampling at depths up to 40 ft. In shallow bays he found *Potamogeton amplifolius–Vallisneria americana* and *Eriocaulon aquaticum–Elatine americana* to be common community types, whereas sandy deltas had associations of *Lobelia dortmanna* and *Myriophyllum pinnatum.* In deeper waters he found associations of *Najas flexilis, Potamogeton gramineus,* and *P. perfoliatus.* At 30 ft., he found beds of *Isoetes macrospora* and *Potamogeton robbinsii,* and at 40 ft., a dense cover of *Nitella flexilis.* With this success, he's now tackling marine eelgrass environments of Long Island.

The next three presenters came as a team representing the newly formed Botanical Club of Cape Cod and the Islands. Don Schall spoke about the group's search for and likely rediscovery of an extant population of *Asclepias purpurascens* on the Cape and the discovery of water hyacinth, *Eichhornia crassipes,* thriving in a spring upwelling near a Barnstable cranberry bog. Mario DiGregorio discussed, with a vial sample in hand, the group's discovery of a county record for *Wolffia papulifera* from a freshwater pond in Barnstable and showed images of sandplain grassland rarities: *Liatris scariosa* var. *novae-angliae* being visited by a monarch butterfly, *Aster concolor* at the northern limit of its range, *Aristida purpurascens,* New England's only perennial awngrass, and *Prenanthes serpentaria* from Nantucket. Pamela Polloni continued with the discussion of *P. serpentaria* by pointing out its hairy calyx, which distinguishes it from *P. trifoliata,* and other aspects of its life history such as pollination by *Bombus* bees and how to recognize the juvenile plants.

—PAUL SOMERS, Recording Secretary.